

Phase Change on Demand Integrated Pressure Pump and Power Plant

Abstract

A portable pressure-driven fluid pump and integrated power supply that relies on high pressure without the use of stored high pressure gases or liquids. A material transitions through a phase change in a constant volume container so that the pressure in the container increases. Programmability and sequential actuation are enabled by patterning the phase change material into the integrated device. The pressure generated may be used to activate an energy transducer such as a high pressure turbine, a piezoelectric material, and an elastic strain material. This provides a hybrid actuation system of electrical energy, pneumatic and hydraulic power. The pressure change in a constant volume container is also harnessed to provide a microbattery.